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ABSTRACT

This paper presents the results of a literature review on educational methodology reforms. The first section discusses five factors in broad-based school reforms: change theory; organizational theory; state/national politics; local politics/governance; and leadership theory. Five types of reforms for school-wide success are described in the second section, including Success for All, Roots and Wings, Core Knowledge, Accelerated Schools, and Modern Red Schoolhouse. The next section addresses educational facilities and issues for community consideration, including school size and teacher-pupil ratios. Barriers affecting implementations of technology are covered in the fourth section, including lack of training, insufficient funding, reluctance of teachers, and unavailability of software. Advantages of computer-based instruction are summarized in the fifth section. The sixth section covers instructional methodology with technology. It is concluded that many of the ideas for improving teaching and learning are based on the ways that humans have learned throughout history; what is different today is the availability of technologies that make it easier for these ideas to be put into practice on a wide scale. An administrators' guidebook for developing a technology plan is appended, including guidelines for nine planning steps (preplan, organize/set goals, develop a plan, prioritize/establish a timeline, make software/hardware decisions, develop a budget, implement, evaluate, revise), tips for administrators, and an annotated list of World Wide Web sites. (Contains 69 references.) (MES)

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THE NEW TECHNOLOGY AND EDUCATIONAL REFORM:

GUIDELINES FOR SCHOOL ADMINISTRATORS

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INTRODUCTION

One of the many challenges facing public schools today is finding ways to integrate technology into the curriculum, both to improve student achievement and to familiarize students with the tools they will need, once they leave school and enter the work force (Blaschke, 1997). Technology continues to play an important role in modern industrial society, integrating technology into the schools will help prepare students to succeed in a rapidly changing world (Copen, 1995; Means et al., 1993; Todd, 1999)).

Our political and business leaders, for example, have clamored for the expansion of technology opportunities in public schools. Schools that effectively use technology have a carefully designed technology plan that is a part of the overall school-improvement plan. A technology plan that is not integrated to the overall improvement plan is likely to be short-lived (Crook, 1998). While these calls on school reforms mostly focus on the use of computers and the Internet, the definition of technology is broader, and should also include multi-media, network, CD-Rom and videodisc-technologies as well as more traditional technologies such as cable television and distance learning (Hollingsworth & Eastman, 1997).

Means et al. (1993) have said there are different kinds of

technology, related applications, and technology uses. These experts have classified technology applications not in terms of their base technologies, but in terms of how they are used with the students. Means et al. (1993) goes on to explain that the classification scheme encompasses tutorial, exploratory, tool, and communications uses of technology. Cohen (1988) has argued, however, that technology has been, and is likely to remain, relegated to the margins of American education. If viewed only as a mechanism for enrichment or remediation, technology will not move forward the agenda of systemic reform.

In our school systems, technology reforms are also changing the way educators view their teaching roles (Crafton, 1998). Technology, which encompasses computers and communication networks, will change how and where education occurs (Kook, 1997). Galletti (1998) says that through smaller size schools, performance is better and the aspects of smaller size schools facilitates the ability to implement new reforms.

Some areas of concern that arise with technological reform and school size are cost, usage, and types of computer-based instruction. Other areas of concern are electronically-based classrooms and implementation of methodologies related to technology (Hollingsworth & Eastman, 1997).

Over the years, educators have heard enough to become jaded about the ability of technologies to transform the school. Yet, there are enough cases where technology and school reform have been successful partners to tell us the marriage can be a productive one (Sheingold & Tucker, 1990; Stearns et al.,

1991; Zorfass, 1991). On the other hand, there are many cases where school districts invested in technology that turned out not to be well used or to be used in ways that merely perpetuated the status quo (Mehan, 1989; Oaks & Schneider, 1984). From the successes, school districts have learned that technology often produces unexpected benefits for students and teachers (Stearns et al., 1991).

Statement of Purpose

The purpose of this paper was to present the results of an extensive literature review on educational methodology reforms available for administrators. The second purpose of this paper was to provide guidelines and strategies to help school administrators implement techno-friendly classrooms and labs.

REVIEW OF RELATED LITERATURE

Principals have used a variety of sources to implement reforms, ranging from local or personal information to workshops and other principals (Snyder, 1998). The experience of the last decade tells school districts that serious reform efforts must not just encompass the classroom, but the whole system where education takes place (Sutton, 1991). Goldhaber (1997) suggests the use of school vouchers will bring competition between public and private in

school-choice issues and school reforms.

Five Factors for Broad-based School Reforms

McAdams (1997) believes it takes five factors to initiate broad-based school reforms, listing these reforms as: Change Theory, Organizational Theory, State and National Politics, Local Politics and Governance, and Leadership Theory. Change theory is a complex process that generally takes between 3-10 years from initiation to institutionalization (Fullan, 1991). Schlechty (1990) affirms that to change an organization's structure, one must not only attend to rules, roles, and relationships, but to systems of belief, values, and knowledge as well. Structural change requires cultural change (McAdams, 1997).

The second type of broad reform is Organizational Theory which is an attempt at decentralizing decision-making. There are four major characteristics of an agile organization: (1) enriching the customer, (2) cooperating to enhance competitiveness, (3) organizing to master change and uncertainty, and (4) leveraging the impact of people and information (Weick, 1982). It is a serious obstacle, however, for those who would initiate statewide or even district-level reforms, for the very nature of schooling is highly resistant to such top-down reforms (McAdams, 1997).

The third type of broad reform is State and National Politics. Chubb and

Moe (1991) have argued that the political nature of American public schools is a fatal impediment to significant school reform. The heart of their argument is that conflict, rapidly changing priorities, a tendency toward micromangement, and cumbersome controls are characteristics of this political process (Chubb & Moe, 1991; McAdams, 1991).

The fourth broad reform is Local Politics and Governance. Successful school reform requires that board members recognize that the continuity of purpose, vision, and structure depends on the board's ability to maintain a steady course, despite change in superintendencies, and even changes in the membership of the board (Schlechty, 1990). Visionary leadership on the part of the superintendent and the board, which is required to produce systemic change, presupposes sufficient time to develop a shared vision (Glass, 1992).

The fifth broad reform is Leadership Theory. Peter Senge (1991) developed the concepts of personal mastery, shared vision, mental models, and team-learning as necessary precursors for mastering what he calls the "fifth discipline". Senge describes a leader as having been in position of leadership for a sufficient time to inspire trust and respect from the staff and to build a culture of teamwork. Along with all of these broad-based school reforms, there are more specific reforms that administrators must consider when meeting school-wide reform efforts.

Reforms for School-wide Success

Fashola and Slavin (1998) list fourteen different types of reforms which include, but are not limited to, the following: Success for All, Roots and Wings, Core Knowledge, Accelerated Schools, and Modern Red Schoolhouse. These types of reforms give administrators a clearer meaning on the importance of each school-wide reform and potential success.

Success for All is a comprehensive reform program for elementary schools (Fashola & Slavin, 1998). This reform emphasizes a balance between phonics and meaning. There is extensive cooperative learning throughout grades 1-6 (Slavin, Madden, & Wasik, 1996). Evidently, math and science was introduced into Success for All and the reform program changed its name to Roots and Wings (Slavin et al., 1996).

Roots and Wings is funded by New American Schools (Slavin et al., 1996). The math component is called Math Wings and is used in grades 1-5. Math Wings uses cooperative learning based on the National Council of Teachers of Mathematics (Madden, Slavin, & Simons, 1997).

Core Knowledge is an approach to curriculum and instruction with the emphasis on teaching a common core of concepts, knowledge, and skills that characterize an educated individual (Madden et al., 1997). Core Knowledge makes few claims to improvements in basic skills, and the evidence to date is not encouraging in these areas (Hirsch, 1993). As a school-wide change

model, Core Knowledge might best be seen as part of larger intervention, with other programs providing basic reading and math skills (Fashola & Slavin, 1998). Core Knowledge is part of the more comprehensive Modern Red Schoolhouse design.

The Modern Red Schoolhouse is a project of the Hudson Institute, a conservative think-tank with headquarters in Indianapolis (Fashola & Slavin, 1998). The program emphasizes core academic subjects, and in the elementary and middle grades, it is based on the Core Curriculum. Modern Red Schoolhouse also makes extensive use of technology in instruction and assessment and has established benchmarks for academic performance that all students must achieve to be advanced to the next grade (Hirsch, 1993).

The last of the reforms is the Accelerated Schools. This approach to school reform is built around three central principals (Levin, 1987). One is unity of purpose, a common vision of what the school should become, agreed to and worked toward by the school staff, the parents, the students, and the community. The second is empowerment, which means that staff, parents, and students find their ways to transform themselves, with not only freedom to experiment, but with a responsibility to carry out their decisions. The third is building on strengths, which means identifying the strengths of the students, the staff, and the school as an organization, and then using these outcomes as a basis for reform (Levin, 1987). One of the key ideas behind Accelerated Schools is that rather than remediate students' deficits, students at-risk of

school failure must be accelerated and given the kind of high-expectations curriculum typical of programs for gifted and talented students (Levin, 1987).

To be able to choose the right reform for a particular school, school personnel need to have access to a wide range of proven and reapplicable options, so that they can make rational and noteworthy choices among programs that work. Based on what is happening in school districts today, critical issues will dictate the educational facility of the future (Becker,1994; Hirsch, 1993; Stevenson & Pellicer, 1996). Stevenson and Pellicer (1996) list the seven critical issues as school size, teacher-pupil ratios, clientele served, programs offered, type and usage of technology, school choice, and funding. School districts need to manage the educational facilities in order to promote future success in these seven areas.

Educational Facilities and Issues for Community Consideration

Ornstein (1990) stated school size has been talked about in the education community and many educators have decided that bigger is not necessarily better. In fact, almost all the literature today on school size advocates smaller schools for elementary, middle, and high school students (Gursky, 1998; Sergiovanni, 1995). Wynne and Walberg (1995) have suggested that students in large schools can fall between the cracks because of communications problems inherent in big, complex organizations. A recent report of the Carnegie Foundation for the Advancement of Teaching concluded

that an elementary school should be small enough for everyone to know one another by name (Boyer, 1995). Sergiovanni (1995) has argued, in order for schools to be successful, they must become caring and learning communities where members feel a responsibility not only for themselves, but also for others. Sergiovanni clearly feels that large school size is an impediment to community building.

Ornstein (1993) has suggested that students who attend smaller schools would more often want to repeat the experience than would those who attend larger schools. When a school is built for 600 students, the focus returns to sub-schools of 200 students (Stevenson & Pellicer, 1996). Ornstein (1990) has suggested that a school is too small when an underutilization of staff and curriculum occurs, and when the operating costs per-student exceeds the average cost in the state. Such schools are also considered too large when a loss of personal or school identity among students occurs, they are unable to fully participate in social and athletic activities or have difficulty interacting among themselves, or feel they do not belong to the student body or school in general.

Similar to the movement to smaller schools is the slow but steady drive to reduce teacher-pupil ratios. Bracey (1995) found more results that confirmed when teachers have fewer students, students perform better academically. The reduced teacher-pupil ratio will allow teachers to become facilitators of

learning, as students become more self-directed as to what and how they learn (Boyer, 1992; Kook,1997).

The newest research on classroom enrollments suggests that teacher-pupil ratios of 1 to 15 will produce much greater levels of achievement than those of 1 to 25, or even 1 to 20 (Stevenson & Pellicer, 1996). As districts move toward the 1 to 15 teacher-pupil ratio, the impact on school facilities will be dramatic (Bracey, 1995). Assuming a standard classroom of 800 square feet at an average cost of $75,000, the reduced teacher-pupil ratio in this example would add more than a quarter of a million dollars to the capital budget (Bracey, 1995).

The difference in teacher-pupil ratios and the cost of expanding school facilities are only a few of the differences school personnel will experience in the future. Traditionally, schools have served students 5 to 18 years old, however, that is rapidly changing (Ahlburg, 1993). Many states have extended their early childhood programs downward to include four year olds, and in some cases, even younger ages. At the other end of the scale, individual schools and school systems, realizing that their communities are aging, are initiating programs to serve adults who desire further training, as well as to others who are seeking new learning and educational growth experiences (Friedman, 1995). Schools of the future will become the "hubs" of the community (Stevenson & Pellicer, 1996).

Nothing may impact on school design more than the revolution now

occurring in the school curriculum and instructional methodology (Dixon, 1994). By the 21st century, teachers will be facilitators of learning as students become more self-directed as to what and how they learn (Boyer, 1992; Kook,1997). What this will mean for school facilities in the 21st century is that classroom design will be different and the total school facility will take on a new appearance (Crafton, 1998; McKinley, 1991).

Classrooms will contain "hubs" in which computers can be hooked up to the school's server. The classrooms will contain at least one laser printer, one television, cable connected, and access to the Internet (Crafton, 1998). While computer labs will continue to serve a useful purpose, their inherent limitations make them ill-equipped to meet student's growing technology demands (Buchsbaum, 1999). Most computer labs are expensive to create and maintain, consume valuable campus space, have outdated equipment and can only accommodate a limited number of users. Computer labs are usually only available before school or after school for individual use (Buchsbaum, 1999).

Barriers Effecting Implementations of Technology

Much of the instruction of tomorrow will be delivered by some form of technology (Glennan & Melmed, 1996). School administrators and teachers need to develop a philosophy which includes long range goals on technology usage and expected learning outcomes from grades K-12 (Luce, 1998).

When a student has mastered the use of computer technology, greater career opportunities will be available (Lanier & White, 1998).

While computer technologies have been available to schools in substantial numbers for about 15 years, administrators are now in a period of transition for technology in education (Sterling, 1995). The study of computer usage in classrooms for learning supported that not the computers, but lack of training and software were the barriers to efficient implementation of technology. Insufficient funding, reluctance of teachers and unavailability of software are areas that have hampered the utilization of computers efficiently in classrooms (Sterling, 1995).

To take full advantage of technologies, schools must rapidly move from their current use of largely isolated, aging, inadequate computers to a core of upgraded machines that are linked to each other and to the world (Office of Technology Assessment, 1995). Cohen (1988) has argued that technology has been and is likely to remain, regulated to the margins of American education. At one time, the dominant use of computers in classrooms was for instruction in "computer literacy" (Becker, 1985). At the high school level, it is still the case that technology is most often available in classes designed to teach computer programming or word processing (Becker, 1994).

Through the use of a Delphi study, information was gathered on which present and emerging electronic technologies would be significant in the year 2,000 for K-12 (Jones, 1997). The Delphi study indicated 2 key strands of

characteristics emerged: connectivity and multifunctionality. The technologies which rated highest had, as characteristics, the ability to be networked with other technologies and the ability to perform multiple tasks. The top 5 technologies were (1) desktop-laptop computers, (2) telephone access to all, (3) world wide web, (4) teacher work stations, and (5) Email (Jones, 1997).

Future Use: Computer-based Instruction

Murphrey (1997) found computer-based instruction (CBI) was more instrumental in facilitating cross-cultural education than traditional classroom instruction. The research design was a quasi-experimental research method known as a nonequivalent control group design. Further findings showed CBI to be a valuable teaching tool when used with traditional classroom instruction. The major findings were: (1) Students in the population studied initially had a relatively low cross-cultural knowledge as the mean score of the pretest was 49 for the control group and 53 for the treatment group out of 100 possible points, (2) Both traditional classroom instruction and computer-based instruction were effective in facilitating learning regarding cross-cultural education, (3) Computer-based instruction was perceived by students to be a valuable teaching tool when used in association with traditional classroom instruction (Murphrey, 1997). Similarity, forced note-taking on a computer through timed activities produced better scores on a post test than optimal note takers and the control group (Armel, 1995). Fazal (1996) also conducted a

study on the use of CBI and found the subjects finished their tasks 30% faster than the control group. In the same study, computer-based instruction was less costly and a more effective, educational approach compared to conventional instruction. The study also indicated CBI to be more effective when used without interactive videodisc than with interactive videodisc.

Meta-analyses of studies at the elementary and secondary school levels generally show a significant advantage for computer-based instruction (Kulik, Kulik, & Bangert-Drowns, 1984; Niemiec & Walberg, 1985). CBI students, on the average, outperformed their counterparts without CBI by .47 standard deviations (Samson et al., 1986). The relative advantage of computer-assissted instruction in these reports appears stronger for disadvantages and low-ability students and for males (Niemiec & Walberg, 1985). Student learning will be self-paced, as each individual uses computerizes instructional components that monitor success, adjust to a student's learning style and success rate, and provide an almost endless variety of interesting materials (Kerr, 1993).

Instructional Methodology with Technology

To infuse technology into today's schools, there must be more than just acquiring equipment (Pisapia, 1994). One of the new instructional methodologies is technology, specifically laptops which are portable. With

laptops, students can do course work and access the network and the Internet from anywhere and at any time (Buchsbaum, 1999). This mobility enables faculty to integrate rich, multimedia course materials into the classroom, creating an interactive environment where students learn by doing instead of through passive observation (Buchsbaum, 1999). Laptops have their own problems, however, such as smaller screens, smaller key boards, and less useful pointing devices (Brier, 1998). In order to implement this new methodology of teaching, schools have formed a partnership with Microsoft-Toshiba, Dell, Compaq computers, and other computer companies which arranged a maintenance and leasing program (Romano, 1998).

Stuppy (1994) found maintaining computers to be an important financial resource of a school's budget. The cost per student on an national average is between $135 and $300 per student. The study continued to show lower socioeconomic schools had a higher breakdown rate, down time, and repair cost than other types of schools. However, Mercer (1998) reported on a school in Coconut Creek Florida, North Browad Preparatory, that uses computers in every course. North Browad Preparatory uses the laptop as a major tool in learning by using the laptop as a book and the Internet as the pages of the book. Knowledge of effective and efficient use of the Internet can make the difference between it being a time saver and a time waster. Schacter, Chung, and Dorr (1998) did studies involving 5th and 6th graders in one study and 8th graders in another. The studies confirmed that children are far more capable of

traveling to and through various resources in cyberspace than in evaluating and using their content. The students were able to navigate the Internet, however, the search results were not always in unison with the students' goals.

There are more than 6 million computers in U.S. schools (Mehlinger, 1996). Using technology as an instructional tool and for improving school administration is a goal for schools throughout the country (Logan, 1999). School reform initiatives cause school personnel to seek new ways to involve parents, businesses, and other community leaders. School web-sites and electronic mail open new avenues of communication with these groups. Almost one third of the population, age 16 and older, have on-line and Internet services (IntelliQuest, 1997).

Computers, CD-ROMs, VCRs, and other digital technologies have become so techno-friendly to today's students that are thriving in the digital world (Tapscott, 1999). The new technologies have helped create a culture for learning (Latham, 1999). Digital media is causing educators and students to shift to new ways of thinking and learning (Tapscott, 1999). The eight shifts of interacting learning are (1) From linear to hypermedia, (2) From instruction to construction and discovery, (3) From teacher-centered to learner-centered education, (4) From absorbing material to learning how to navigate and how to learn, (5) From school to lifelong learning, (6) From one-size-fits-all to customized learning, (7) From learning as torture to learning as fun, and (8) From the teacher as transmitter to teacher as facilitator (Tapscott, 1999).

Other influential people in different states are also promoting computer initiatives. Dr. Jack Christie, the Chairman of the Texas Board of Education, has proposed to divert the funds set aside for textbooks toward the purchase of laptops (Romano, 1998). With the "E-rate" program, formally called Universal Service Fund for Schools and Libraries, which is an unique nationwide program to connect every school and library in the United States to the Information Age, 1.9 billion dollars is now accessible for all communities to have equal access to modern technologies in their classrooms (Revenaugh, 1999). President Clinton (1996) even stated at his acceptance speech at the Democratic National Convention,

> We need schools that will take our children into the next century. We need schools that are rebuilt and modernized with an unprecedented commitment from the government to increase school construction and with every singular library and classroom in America connected to the Information Superhighway by the year 2000. Now, folks, if we do these things, every 8-year-old will be able to read, every 12-year-old will be able to log in on the Internet, every 18-year-old will be able to go to college,and all Americans will have the knowledge they need to cross that bridge to the 21st century.

What makes the Internet special is that it is techno-friendly, so even young children can use it with out thinking about technology (Teicher, 1999). Technology has the potential to decrease opportunity gaps by granting students from different backgrounds equal access to the wealth of information on the Internet (Latham, 1999). These factors are certainly noteworthy for future educational and lifelong learnings.

PROCEDURES

The appeal of campus-wide computer programs is simple. The programs level the "academic playing" field and give all students equal access to technology that is becoming critical for classroom success. Universal access removes the disparity between students who have technology and those who do not (Buchsbaum, 1999). Students without computers-- approximately half the current student population--are at a distinct disadvantage in the classroom and in the future workplace (Crafton, 1998).

Using the extensive literature review and research on educational methodology reforms available for administrators, a guidebook was developed for the use of technology-methodology in the classroom. The recommendations to administrators for the implementation of techno-friendly classroom and labs were included in the guide book . The development of a time-line for a school's new technology-methodology with the focus on, but not limited to computers, cost, accessories, and other devices to ensure proper usage were also included in the administrator's guidebook. Some examples of technologies that can be used in a school were: a) technology hardware b) E-mail c) Internet usage and d) educational software for administrators' references. Notation of web sites for the integration of subject areas such as mathematics, science, and history were also included. The final area of concern for administrators was the facility in design of a techno-friendly

computer lab (See Appendix).

CONCLUSIONS

Many of the ideas for improving teaching and learning are common sense. They are based on the ways that humans have learned throughout history, and have a long track record of being used effectively in innovative schools around the world. What is different today is the availability of technologies that make it easier for these ideas to be put into practice on a wide scale. Technologies like computers, telecommunications networks, and virtual reality have the potential to transform education as profoundly as trains, planes, and automobiles have revolutionized transportation (M. Hankins, Personal communication, February 16, 1999).

Effective learning requires access to good information and avenues for interaction. For students in the not-too-distant past, that meant the contents of textbooks, the knowledge possessed by their teachers, and the limited selections in their school library. Today's students, by contrast, have access to far richer and more current sources of information from digital devices accessed via local or wide-area networks. As more primary source material gets digitized and put on the Internet, students are able to develop new knowledge from original research. Instead of reading about World War II in a textbook, they can see documentary footage from the war, listen to speeches by

leaders on both sides, and read the full texts of the terms of surrender. If a student becomes curious about a particular aspect of the war, say the first black fighter squadron, he or she can search out experts and even communicate with actual airman or their relatives through E-mail. Suddenly, learning can be more exciting and immediate than watching television.

This information and expertise frees teachers from always being the main dispensers of information. They can use their time instead to plan more ambitious activities and to work with individuals or small groups of students as they tackle each new challenge.

Technology is also giving educators the power to offer more experimental learning, the kind of learning that has taught all of us most of what we know. Schools have been hamstrung in providing hands-on learning, aside from sports, for example, by the limitations of resources and the logistics of taking students off-site. Through realistic computer simulations of real-world environments, jobs, and problems, students will be able to have rich and rewarding learning experiences. They will be and are traveling to distant parts of the world via the World Wide Web, investigating ocean bottoms and learning to fly air planes without leaving the classrooms.

Our schools have only begun to explore the potential of information and communication technologies. They lag far behind businesses in using tools like computers and the Internet in their daily work. In many jobs today, people use technology for communication, information-gathering, and problem solving

(L. Elsberg, Personal communication, March 1, 1999). Outside of work, growing numbers of people use electronic resources like the Internet to keep in touch with friends, do their banking, play interactive games, conduct research, and participate in on-line discussions. Since the power-price ratio of microchips continues to double every two years, it is likely that technology will play a ubiquitous role in unimagined ways throughout the lives of our nation's children and teachers.

Interactive multimedia and telecommunications technologies can be powerful tools for educational improvement, but they are only tools. Their power can only be unleased if we also pay sustained attention to curriculum, school organizations, educational philosophies, instructional practices, family and community involvement, and the other components of successful schools.

Technology is not a cure-all for American schools; it is a tool that is only as useful as the decisions we make about its usage. In the hands of creative teachers and inspired students, however, technology makes possible the kinds of classrooms with all students working to their full potential (D. Sons, Personal communication, February 5, 1999).

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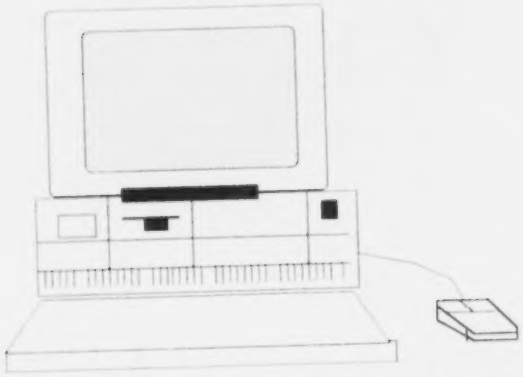
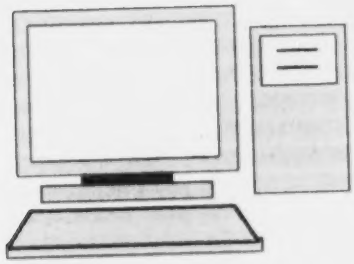
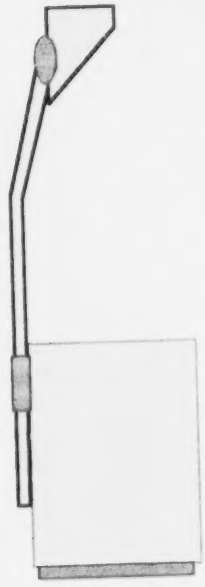
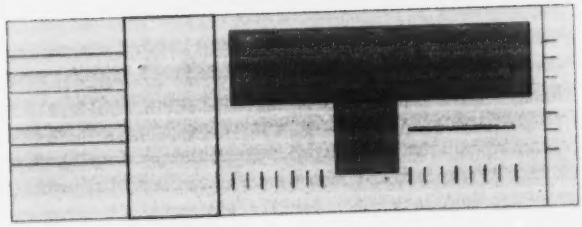


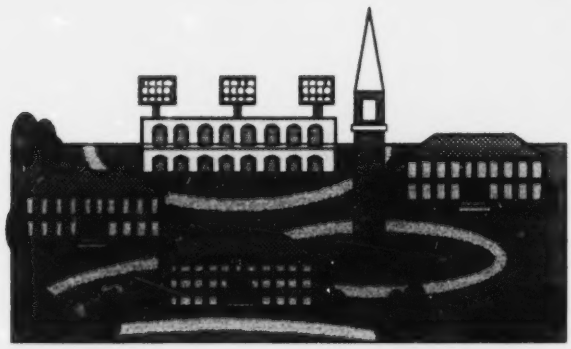


APPENDIX





ADMINISTRATOR'S GUIDEBOOK



DEVELOPING A TECHNOLOGY PLAN

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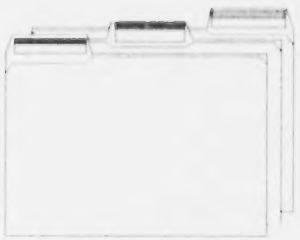
STEP 1

PREPLAN

Step 1: Preplan

1. Define your school climate.
    - Is your district resistant to change?
    - Does it have a top-down management style?
    - What is the overall attitude towards technology?
    - Does the superintendent and the school board support technology?
    - What is the political climate?
    - What are the district's priorities?
2. Find out the current status of technology in the school district.
    - What type of equipment is available?
    - If you currently have technology, what is it being used for?
    - Who is using the technology?
    - What is the frequency of use?
3. Discover the previous, if any, budget for technology.

STEP 2



ORGANIZE AND SET GOALS

Step 2: Organize and Set Goals

1. Organize the planning team.
    - Form an advisory committee. There should be representation by teachers, administrators, parents, the business community, and students. This group could largely be dependent upon the size of the school district. It should foster the direction and provide new innovations for technology.
    - Form a steering committee. This group should be comprised of representatives from each group along with the technology leaders. A manageable size of 5-8 members is best. This group should provide more of the details of the overall plan.
    - Choose a leader for each group formed. These people should keep each of the groups on task and probably should be chosen by the superintendent or the school board to lend credibility. You may want two groups. One group working on k-3 and one group working on grades 4-6 curriculum. Make sure timelines written and deadlines are met.
2. Determine the direction of technology in your school.
    - What are the overall goals of technology?
    - What are the expected student outcomes?
    - What are the basic needs of your students?

3. Create a Vision Statement

- What do you expect out of the plan?
- Make this statement based on reality. Too broad or too narrow will not foster trust from those in the community, teachers, administrators, and board members.
- Make sure the person writing the plan has excellent writing skills. Make the plan straight-forward and readable.

STEP 3

DEVELOP A PLAN

Step 3: Develop a Plan

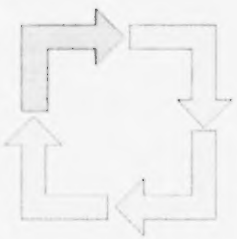
1. Develop a Curriculum and Instruction Integration Plan.
    - Since you have curriculum in place, how will technologies enhance learning?
    - Provide technology across the curriculum.
    - Decide how instruction will be delivered.
    - Which technologies are for specific use and which are for general use?
    - Establish district baseline standards for software. Each machine should go out with specific software loaded. K-3, 4-6, 7-9, 10-12 may be a logical breakdown for particular software.
2. Provide a District-wide Staff Development Plan.
    - Find out what training is needed.
    - Maximize hands-on training.
    - Have a training lab or room and make sure that it is maintained and upgraded on a regular basis. This could be for district-wide use or for larger districts several training areas for geographical areas of the district.
    - Make sure that what is taught can be used in the classroom both in technology available and application to subject matter.

- Try to separate training sessions by user levels. For instance, awareness, introductory, intermediate, advanced, and specialized levels may be offered.
- Inform all educators of what skills are needed at each skill level. Advertise the time schedule of the courses being offered.
- Train concurrently with installation of appropriate technology.
- Serve as a role model by using E-mail, using computers, demonstrations with the full power of multimedia, and teaching with the use of emerging technologies.
- Make several short courses available rather than one long course.
- Offer 24-hour use of the training facility, if possible, especially during the summer months.
- Offer incentives to those willing to implement technology in the classroom. This may be in forms of: time off for conferences, in-service alternatives, or shadowing other district's technology plans.
- Publicize the efforts of those participating.

3. Develop a support team for technology.
   - Hire and provide job descriptions for personnel.
   - Hire a coordinator/director of technology to provide all schools with the "big picture" and to serve as the head of technology for the district. Change the job descriptions of those currently handling technology to fit the plan. Use these people to foster technology at the building level.

- Provide for support of technology, technicians, and trainers of technology. Innovators of technology in curriculum are the backbone to the end users: students, teachers, and administrators. If your district is small, consider hiring an educational technology firm and outside help on a limited per-year contract. Another idea would be to form a consortium with other small school districts and share the cost of these professionals.

STEP 4



PRIORITIZE AND ESTABLISH A TIMELINE

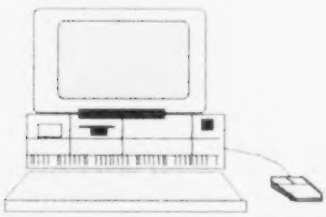
Step 4: Prioritize and Establish a Timeline

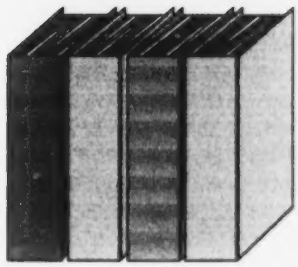
1. Prioritize your lists of projects.
    - During your initial research of what technology exists, determine what is top priority by project and equity.
    - Make sure that everyone understands how the priorities were arrived at and when they are scheduled for possible installation.
    - If possible, start at both ends of the spectrum. If you have facilities that will need updating before technologies can be in placed and some buildings that are suited now, try to do a little at both ends.
    - Establish hardware and software baseline standards.
2. Establish your support services as well as personnel for the upcoming jobs.
    - Remember that personnel is as important as hardware and software. They must be in place as the process begins.
    - Send personnel needed to support technology to training, especially if they come from within the school district.
    - Have a training lab or room and make sure that it is maintained and upgraded on a regular basis.
    - Begin working on the resource center, establish resources, and services that will be provided.
    - Establish your infrastructure for things like liaisons, building support, and community support.

3. Develop a timeline.

- Your plan should provide an overall goal in the long term, but should also provide a one to two-year plan of action for specifics (i.e. hardware, software, purchasing, specific budgeting).
- You should have a realistic timeline.

STEP 5



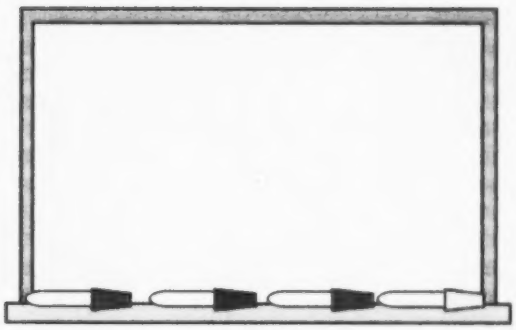


MAKE SOFTWARE AND HARDWARE DECISIONS

Step 5: Make Software and Hardware Decisions

- Have the curriculum committee decide what software will be utilized throughout the district at the appropriate grade levels.
- Determine your software needs, based on curricular concerns, before you make hardware decisions.
- Check into purchasing district licensing of building site licenses, whenever possible.
- Include networking software, backup software, library systems, and administrative systems software.
- Purchase hardware in as large a quantity as possible to ensure good pricing.
- Make sure purchased hardware is upgradeable and will work connected to a network.
- Standardize purchasing as much as possible. It costs less for support and service. It also provides the same environment in each building for students moving around in the district.

STEP 6

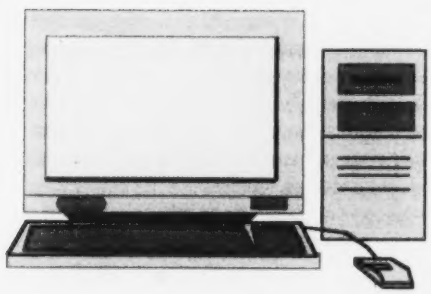


DEVELOP A BUDGET

Step 6: Develop a Budget

1. Include cost for the following:
    - On going staff development.
    - Equipment (security, storage for media, etc.), hardware, and software.
    - Building renovations to support electrical and wiring needs of technology.
    - Teams and personnel required for support.
    - Five to ten percent should be added for fluctuations in pricing and emerging technologies.
    - Upgrades for both software and hardware are imperative budget items. This should be on a 2 or 3-year rotation schedule.
    - New construction of schools should include a detailed budget for technologies and infrastructure for a delivery system.

STEP 7



IMPLEMENTATION

Step 7: Implementation

1. Begin implementing the Curriculum and Instruction Integration Plan that you developed in Step 3.

2. Start organizing the physical facilities for the Training Center(s).

3. Hire the support people necessary to staff the Training Center(s).

4. Schedule the District-wide Staff Development offerings and put in place the incentives that were established as a result of Step 3.

5. Monitor progress on your timeline items.

6. As you are moving forward on items 1 through 5, begin making purchases that you decide upon in Step 5 and budgeted for in Step 6.

- Be realistic in how much you can purchase.
- Know your vendor's procedures and policies on warranties and service.
- Know your vendor's return policies.
- Justify your recommendations.
- Provide an overall budget, but break down annually.
- Take advantage of buying in quantity.
- Stay on the cutting edge of technology and revise your hardware needs on a monthly basis.
- Check out leasing options.
- Be frugal. Do not spend all your money at once.

STEP 8

EVALUATE

Step 8: Evaluate

1. Teachers
    - Survey teachers one year after implementation concerning their usage of instructional technology.
    - Allow for concerns and opinions on improving their use.
    - Provide an electronic suggestion box.
2. Students
    - Track students after graduation to determine how well they are prepared in the area of technology.
    - Address students' technology needs with a yearly-skills survey of those currently in the work force who graduated five years previously.
    - Hire an external consultant to provide an extensive evaluation.
    - Include the following areas in evaluation:
        - Staff development needs
        - Installation and service/maintenance
        - Student usage
        - Administrative use
        - Overall usage
        - Frequency of use
        - Access to technology fits the need

STEP 9

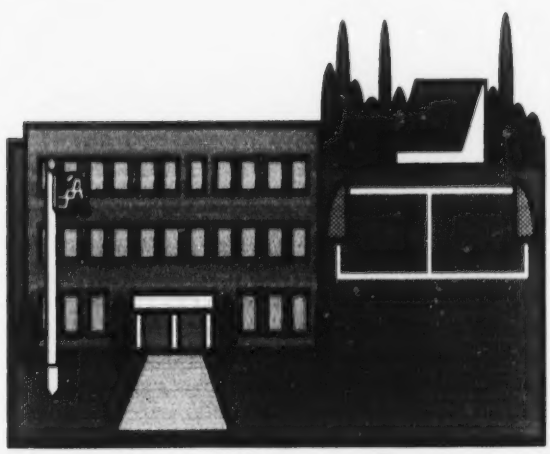
REVISE

Step 9: Revise

1. Revise your document every six months to one year.
    - Re-evaluate your purchases on a monthly basis. Technologies are changing at a rapid rate.
    - Use your evaluation results to make changes in your plan.
    - Implore your original committee members to revise, as well as recruiting new members for fresh views.

TIPS FOR

ADMINISTRATORS



Tips for Administrators

1. If you are going to ask people their opinions, LISTEN.

2. Quality is infinitely better than quantity.

3. Have realistic expectations of people and programs.

4. Make sure that those you hire to lead technological changes are competent, and that you are clear as to what you want them to accomplish.

5. Set up contingency plans as warranted.

6. Know that change is a painful process and administrators should be ready for the bumps in the road to success.

7. People come before technology.

8. Take a step back from things every once in while to view the overall picture.

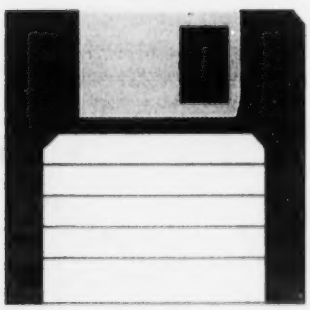
9. Do not expect others to become responsible for things they have no way of delivering.

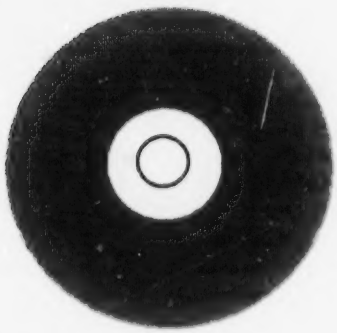
10. Acknowledge people for their good work on a regular basis.

Hire technologically-capable teachers. Many universities and colleges are now preparing teachers to use technology in the classroom. Take advantage of that capability.

11. Do not get into platform arguments. Let the committee and the existing software evolve, determining what is used and where.

SITES TO CHECK OUT





Sites to Check Out

1. General

- Apple Learning Exchange. Excellent assortment of annotated Web based projects. Topics run the gamut from history to zoology. http://ali.info.apple.com/ali/projects_list.html
- Internet Discussion Groups for Educators (and Students). Teaches you how to subscribe to a discussion group (LISTSERV) and provides a massive listing of education-centered groups. http://edweb.gsn.org/lists.html
- MidLink Magazine. Written for kids by kids, MidLink explores a variety of educational disciplines through articles, essays, and art. http://longwood.cs.ucf.edu/~MidLink/

2. Science Education

- Bill Nye the Science Guy. The Web home of a favorite TV program. http://nyelabs.kcts.org
- National Science Foundation. Information about the HSF, grants, etc. http://www.nsf.gov
- Newton's Apple. Science program for students produced by KTCA public TV in St. Paul, Minnesota. http://www.ktca.org/newtons

3. Mathematics

- History of Mathematics Home Page. Delivers what it promises and more. Very concise with links to other mathematical sites.
  http://aleph0.clarku.edu/~djoyce/mathhist/mathhist.html
- Mathematical Resources on the Web. Hundreds of links to look at concerning all areas of math.
  http://www.math.ufl.edu/math/math-web.html
- MegaMath. Everything you ever wanted to know about math, but were afraid to ask.
  http://www.c3.lanl.gov/mega-math
- Ask Dr. Math. Got a math question? Well ask Dr. Math.
  http://forum.swarthmore.edu/dr.math/dr-math.html
- Math Lesson Plans at ERIC. Lesson plans on all facets of math.
  http://ericir.syr.edu/Virtual/Lessons/Mathematics/index.html

4. Social Studies

- City.Net. Search for information on major cities, states and regions, and countries.
  http://www.city.net
- U.S. Government links. Nebraska's Educational Service Unit #3 has gathered a great collection of government links.
  http://esu3.k12.ne.us/sites/GOVERNMENT_US.html

- Social Studies Sources. Through and well-organized Web site to explore cultures, maps, and geography.

  http://education.indiana.edu/~socialist

5. Search Engines

- Alta Vista. One of the fastest and most comprehensive search engines currently available. It hunts hundreds of thousands of servers, mailing lists, and newsgroups, usually reporting back in seconds.

  http://altavista.digital.com

- Excite!. Excite offers a fast and comprehensive search engine as well as a variety of specialized subject areas, Web site reviews, and news feeds. Some subject areas contain weekly columns that are hotlinked to other relevant Web sites.

  http://www.excite.com

- HotBot. This site is capable of indexing and searching every word on the World Wide Web. As a result, users can conduct more complex searches.

  http://www.hotbot.com

- InfoSeek. Search engine to explore the Internet.

  http://www.infoseek.com

- Lycos. Not quite as comprehensive or fast as some sites, but turns up resources sometimes not available through other searchers.

  http://www.lycos.com

- Ask Jeeves. This site allows the user a powerful search engine.

  http://www.askjeeves.com

- Dogpile. New power search engine.

  http://www.dogpile.com

- MetaCrawler. An easy to use search engine that maintains a detailed list of education-related links.

  http://www.metacrawler.com

6. Finding Places

- MapQuest!. Through the Interactive Atlas, you can enter a state, city, or street address, and you will get a custom map of the destination.

  http://www.mapquest.com

- Map On Us. Like MapQuest, this site can pinpoint an address, provide route information and search for businesses through their Yellow Pages listings.

  http://www.mapsonus.com

- Xerox PARC's Map Viewer. From Xerox's Palo Alto Research Center (PARC), this site offers the silent innovators of computer networking, the mouse, on-screen windows, and pull-down menus.

  http://pubweb.parc.xerox.com/map

- Library of Congress. The library of libraries. Includes online exhibits, historical information, and much more.

  http://www.loc.gov

- U.S. Universities/Community Colleges. If U.S. Universities/Community Colleges are on the Internet, you will find them here.

  http://www.utexas.edu/world/univ

7. Other Educational Sites

   - Amazon.com. A bookworm's delight! The best place to find information on books. This online bookstore has an extremely powerful searchable database of virtually every book ever published.

     http://www.amazon.com

   - AskERIC Home Page. Includes links to lesson plans, the ERIC database and digests, Listservers, and other outstanding features. Outstanding for researching educational topics.

     http://ericir.syr.edu

   - Busy Teacher's Web Site. A well organized collection of educational links.

     http://www.ceismc.gatech.edu/busyt/homepg.html

   - U.S. Department of Education. An excellent site for all sorts of educational information including current research, projects, teacher's links, and other helpful information.

     http://www.ed.gov

- Web 66. Links schools to lesson plans, student work, collaborative projects, and a list of schools on the Web. Sponsored by the University of Minnesota.

  http://web66.coled.umn.edu